

REMARKS

Claims 29-47 are pending in the present application. Claims 29, 31, 33, 36, 38, 41, 43, 44, 45, 46, and 47 have been amended to recite that the proportion (HI) of vinyl-cis-polybutadiene being insoluble in boiling n-hexane is 30 to 60%, and the reference to hydrocarbon-based organic solvent has been replaced with cyclohexane solvent. Claims 30, 32, 34, 35, and 37 have been amended to be consistent with the claims from which they depend. Support for the amendments to the claims can be found at, for example, paragraphs [0046] and [0060] of the specification as filed and claims 30, 32, 34, 35, and 37. No new matter has been added and Applicants respectfully solicit that the present Amendment be entered.

Claims 29, 33, 36, 38-40 and 42-47 are rejected under 35 U.S.C. § 103(a) as unpatentable (obvious) over Japanese Patent Application No. JP 05-194658 (Kawaguchi) in view of Rubber Material Performance and Design Application (Zheng Fu). The Examiner alleges that Kawaguchi discloses a process for producing a polybutadiene rubber composition including forming component "A" by subjecting 1,3-butadiene to cis-1,4-polymerization and subsequent reaction with a 1,2-syndiotactic polymerization catalyst. The Examiner further alleges that the component "A" can be mixed with component "B" which can be a high cis-polybutadiene rubber. The Examiner acknowledges that Kawaguchi fails to disclose the recited catalysts to make the polybutadiene and relies on Zheng Fu for this teaching. Applicants respectfully but strenuously traverse the rejection of claims 29, 33, 36, 38-40, and 42-47 in view of Kawaguchi and Zheng Fu for the reasons set forth below.

The Examiner states at page 3 of the Office Action that Kawaguchi discloses at paragraph [0020] that the prepared polybutadiene rubber from Example 1 of Kawaguchi can be mixed with a high cis-polybutadiene rubber. However, the machine translation that was provided by the Examiner does not appear to clarify at paragraph [0020] that the polybutadiene rubber from Example 1 of Kawaguchi is blended with a high cis-polybutadiene rubber. Accordingly, an Explanation for the Examiner's interpretation of Kawaguchi as described at page 3 of the Office Action is respectfully solicited.

Additionally, claims 29, 33, 36, 38-40 and 42-47 now recite, either directly or indirectly, the vinyl-cis-polybutadiene having a proportion (H1) of a boiling n-hexane insoluble matter of 30 to 60% by weight. Kawaguchi expressly teaches away from such feature. Specifically, the machine translation of Kawaguchi provided by the Examiner discloses the following at paragraph [0012]:

A rate of a boil n-hexane insoluble matter needs to be 10 to 25 weight %. If there are few rates of a boil n-hexane insoluble matter than 10 weight %, a problem that hardness of polybutadiene rubber, an elastic modulus, and disruptive strength fall will arise. On the other hand, when more than 25 weight %, the compound ML of polybutadiene rubber becomes high too much, and difficult arises in workability [emphasis added].

Thus, Kawaguchi expressly teaches that the amount of boiling n-hexane insoluble matter should not be more than 25% in order to avoid difficulties with workability. In contrast, the presently claimed process uses vinyl-cis polybutadiene having 30 to 60% by weight of a boiling n-hexane insoluble matter.

Additionally, claims 29, 33, 36, 38-40 and 42-47 now recite, either directly or indirectly, a mixture containing 1,3-butadiene and a cyclohexane solvent. Kawaguchi fails to disclose or suggest this feature. In fact, the 1,3-butadiene disclosed in Kawaguchi is dissolved in a benzene solvent, as disclosed at paragraph [0032] of Kawaguchi. Moreover, the utilization of a different solvent in the claimed invention results in different electronic and stereoscopic influences on the polymerization of catalytically active species, resulting in a different polymerization product. Thus, the claimed invention not only recites a different solvent, but also results in a different polymerization product.

Furthermore, claims 29, 33, 36, 38-40 and 42-47 recite, directly or indirectly, solution mixing components (A) and (B) as recited in those claims. For example, claim 29 recites that (A) comprises a vinyl-cis-polybutadiene solution, and (B) comprises a cis-polybutadiene solution, and (A) and (B) are recited as being mixed. The use of solution

mixing provides compatibilizing effects for the components which are being mixed. While the Examiner alleges that paragraph [0020] of Kawaguchi discloses mixing the polybutadiene rubber composition of Example 1 with a high cis-polybutadiene rubber, the Examiner has not identified any disclosure in Kawaguchi that this alleged mixing occurs in the form of solutions.

In view of the above, claims 29, 33, 36, 38-40 and 42-47 are distinguishable over Kawaguchi. Zheng Fu fails to cure the deficiencies identified above regarding Kawaguchi. Accordingly, reconsideration and withdrawal of the obviousness rejection of claims 29, 33, 36, 38-40 and 42-47 in view of Kawaguchi and Zheng Fu are respectfully solicited.

Claims 29, 30, 32, 34, and 37 are rejected under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 4,379,889 (Ashitaka) in view of Zheng Fu. The Examiner alleges that Ashitaka discloses a process for producing a polybutadiene rubber comprising a first polymerization mixture comprising 1,3-butadiene and a polymerization medium in the presence of a cis-1,4-polymerization catalyst which results in a first polymerization. Ashitaka allegedly discloses a second polymerization mixture comprising the resultant cis-1,4-polybutadiene in the presence of a 1,2-polymerization catalyst for a second polymerization. Further, the Examiner alleges that the prepared polybutadiene rubber can be blended with natural rubber or high cis-1,4-polybutadiene rubbers. The Examiner acknowledges that Kawaguchi fails to disclose the recited catalysts to make the polybutadiene and relies on Zheng Fu for this teaching. Applicants respectfully but strenuously traverse the rejection of claims 29, 30, 32, 34, and 37 in view of Ashitaka and Zheng Fu for the reasons set forth below.

Claims 29, 30, 32, 34, and 37 all recite, directly or indirectly, the mixing of a vinyl-cis-polybutadiene component with a cis-polybutadiene component. Ashitaka fails to disclose or suggest such feature. Although at page 5 the Examiner cites to claim 1 and col. 6, lines 47-49 of Ashitaka for the proposition that the prepared polybutadiene rubber can be blended with natural rubber or high cis-1,4-polybutadiene rubbers, Applicants respectfully disagree. Claim 1 of

Ashitaka fails to disclose or suggest a cis-polybutadiene component or a process step for mixing it with a vinyl-cis-polybutadiene component.

Similarly, Ashitaka fails to disclose or suggest such feature at column 6, lines 47-49. The disclosure of column 6, lines 43-49 of Ashitaka is reproduced below:

The polybutadiene rubber produced in accordance with the process of the present invention may contain conventional additives, for example, vulcanizing agent, vulcanizing accelerator, reinforcing agent, filler, antioxidant, pigment, process oil and the like, which are usually blended with natural rubber or high cis-1,4-polybutadiene rubbers.

Ashitaka thus discloses at column 6, lines 43-49 that the polybutadiene rubber may include conventional additives. Ashitaka's disclosure further points out that those conventional additives are usually blended with natural rubber or high cis-1,4-polybutadiene rubbers. Thus, there is no disclosure of blending a vinyl-cis-polybutadiene component with a cis-polybutadiene component since the reference to high cis-1,4-polybutadiene rubber is merely a description of what the conventional additives are sometimes blended with. Thus, the disclosure of Ashitaka is distinguishable over the claimed invention, and is more analogous to, for example, Comparative Example 1 of the present specification rather than to the claimed invention.

Additionally, claims 29, 30, 32, 34, and 37 recite, directly or indirectly, solution mixing components (A) and (B) as recited in those claims. For example, claim 29 recites that (A) comprises a vinyl-cis-polybutadiene solution, and (B) comprises a cis-polybutadiene solution, and (A) and (B) are recited as being mixed. The use of solution mixing provides compatibilizing effects for the components which are being mixed. While the Examiner alleges that Ashitaka discloses at column 6, lines 47-49 the mixing of the polybutadiene rubber composition with a high cis-polybutadiene rubber, the Examiner has not identified any disclosure in Ashitaka that this alleged mixing occurs in the form of solutions.

To the contrary, the disclosure in Ashitaka expressly discloses drying the polybutadiene rubber which is produced. At column 6, lines 4-13, Ashitaka discloses either drying the reaction mixture (after the 1,2-polymerization) or precipitating, separating, and drying the reaction mixture. Thus, there is express disclosure that the polybutadiene rubber is dry, and not in solution form. Additionally, there is no indication that the natural rubber and cis-1,4-polybutadiene rubbers disclosed at col. 6, lines 48-49 of Ashitaka are in solution, even if they were blended with the reaction mixture.

In view of the above, claims 29, 30, 32, 34, and 37 are distinguishable over Ashitaka. Zheng Fu fails to cure the deficiencies identified above regarding Ashitaka. Accordingly, reconsideration and withdrawal of the obviousness rejection of claims 29, 30, 32, 34, and 37 in view of Ashitaka and Zheng Fu are respectfully solicited.

Claims 31, 35 and 41 are rejected under 35 U.S.C. § 103(a) as obvious over Kawaguchi in view of Zheng Fu and further in view of U.S. Patent Application Publication No. 2008/0233399 (Asakura). The Examiner relies in part on the disclosure of Kawaguchi and Zheng Fu as described above for the rejection of claims 31, 35, and 41. However, claims 31, 35, and 41 recite, directly or indirectly, the features of the vinyl-cis-polybutadiene having a proportion (HI) of a boiling n-hexane insoluble matter of 30 to 60% by weight, and solution mixing components (A) and (B) as recited in those claims. As explained above, Kawaguchi fails to disclose or suggest such features. Zheng Fu and Asakura fail to cure the deficiencies identified above regarding Kawaguchi.

In view of the above, claims 31, 35, and 41 are distinguishable over Kawaguchi in view of Zheng Fu and Asakura. Reconsideration and withdrawal of the obviousness rejection of claims 31, 35, and 41 in view of Kawaguchi, Zheng Fu, and Asakura are respectfully solicited.

CONCLUSION

In view of the foregoing Amendment and Remarks, Applicants respectfully submit that the claims distinguish over the cited art. Therefore, the present application is in condition for allowance. Reconsideration and an early Notice of Allowance are respectfully requested.

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